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AUTHOR Lopez, Luz E.; Sanchez, Adolfo
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ABSTRACT

The ability to think is a natural part of every human being and must be developed to its maximum potential. Consistent with educational reform efforts which emphasize the development of basic and complex thinking skills, this paper describes a model designed for curriculum planning which integrates ideas from critical thinking experts. The model's theoretical basis is built upon four different curriculum planning approaches: competency-based, ability-based, concept-based, and the Thinking Skills Model, each of which is described and explained as an aspect of the planning model as a whole. The model identifies the various essential elements of systematic curriculum planning, and the example used is a teacher competency chosen from the Teachers' Preparation Program of Cayey University College (Puerto Rico), a program with three main components: Educational Foundation, Methodology, and Practice Teaching. Once the competency and thinking skills are selected they become the basis for the elaboration of the other components of the model, which takes the required content across the curriculum and shows its depth and scope through three different levels of a student's cognitive and professional development: beginner, intermediate, and advanced. To illustrate the model, a topic and a teacher competence are presented in chart form and much of the text of this report is given over to a detailed explanation of each of the chart's 10 columns, or categories. A sample lesson is also provided. (LL)

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A Model for Integrating Thinking Skill in the Curriculum

12th Annual International Conference on
Critical Thinking & Educational Reform

Dr. Luz E. López
Prof. Adolfo Sánchez

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A MODEL FOR INTEGRATING THINKING SKILLS IN THE CURRICULUM

Dra. Luz E. López
Prof. Adolfo Sánchez

"The result of teaching is an educated reasoning."
Eugenio Maria de Hostos

INTRODUCTION

Every educational system must be built upon a philosophical basis from which the goals that guide the teaching learning process emanate. The foremost aspiration of such a system is to develop an integral human being, capable of adequately interacting with his/her world.

Hostos premise that "the result of teaching is an educated mind" may imply that to educate reason teaching should be guided to the development of critical minds activating the mental processes. The ability to think is a natural part of every human being. This capacity must be developed to its maximum potential. The Critical Thinking movement embodies this mandate. Its basic concern is to provide a body of cognitive and affective skills that will permit a person to interact dynamically to his/her world.

In Puerto Rico the Educational Reform Act of 1988 demands an emphasis on the development of basic and complex thinking skills. The State Department of Education has adopted this emphasis in conjunction with the teaching of values and the relevance of the teaching context and content as the integrating principles of its curricular revision. The institutions that collaborate in the preparation of teachers must translate these principles into functional units through a curriculum designed to integrate concepts, skills and attitudes utilizing content as a vehicle to activate the thinking processes.

With this in mind the authors designed a model for curriculum planning which integrates the new ideas brought about by the critical thinking experts with three other models for curriculum planning: the Competency-based approach, the Ability-based Learning Program of Alverno College and the Concept-based system. This curriculum design considers the development of a specific content along the program requirements for the preparation of teachers at the Cayey University College in Cayey, Puerto Rico.

This model of curriculum design takes the required content across the curriculum and shows its depth and scope through the three different levels of a students' cognitive and professional development: beginner, intermediate and advanced. The depth and scope of the content treatment revolves around the complexity of the thinking skill required and the degree of reflective stimuli.

BASIC ASSUMPTIONS

1. Every human being is a thinking being.

2. Thinking skills can be systematically developed.

3. The teaching experience must provide for activating mental processes.

5. A student is an active being, capable of processing information, with a natural curiosity who likes to discover.

5. A student is capable of learn how to learn.

6. Content should be the vehicle for the development of skills and attitudes.

7. Every fundamental concept must be treated in a spiral way to assure an increase in complexity and depth across the curriculum.

8. The relevance of the learning experience depends on the academic context and the developmental stage of the learner.

9. A teacher should be a facilitator of the learning experience.

10. The assessment process should be authentic, continuous and varied.

THEORETICAL BASIS.

As mentioned before the theoretical basis for this model is built upon four different curricular approaches: Competency-Based, Ability-Based, Concept-Based and Thinking Skills Model. The Competency-Based dimension of the model follows the steps listed by the Competency-Based Teacher Education (CBTE) (Cruickshank, 1985):

1. Identification of specific teaching competencies,
2. The competencies are stated in terms of observable teacher behavior,
3. Preparation of curriculum materials,
4. Performance of one or more competencies by the pre-service teacher, and
5. Evaluation of the student's performance.

Any competency so identified will require the demonstration, by the future teacher, of the degree of mastery of the content (knowledge), besides his effectiveness in the application of the competency (skill) and the value of such knowledge or skill for his/her professional endeavor (attitudes).

The Ability-Based component of the model follows the educational philosophy of Alverno College, Milwaukee, WI, where the maximum degree of skill performance is achieved gradually through three levels of development: the beginner, intermediate and advance.

The Concept-Based aspect of the model provides a core content that is elaborated repetitively and systematically in various courses from one or several study programs. Bruner's spiral curriculum approach allows for the systematization of content treatment from different points of view, levels of abstraction, and varied utilization making the learning activity more relevant to the student as it relates better to his experiences, interests, motivation and needs.

In summary, after the competency to be developed with its level of ability and its required degrees of performance is identified, the core content is then selected.

The thinking skills of the discipline and the ones to be developed through the different course are selected, too. On the next part of this paper a description will be found under the thinking skills component.

The selection of the competency and the thinking skills are selected they become the basis for the elaboration of the other components of the model.

THE MODEL.

The model identifies various essential elements to a systematic curriculum planning. These components are described later. To illustrate this model of curricular planning a teacher competency has been chosen from the Teachers' Preparation Program of the Cayey University College. This program has three main components: Educational Foundation, Methodology and Practice Teaching.

The model has twelve components. The first component is the concept translate in the main topic of the unit of study. The second one is the competency to be developed. It is stated at the highest level of performance.

The professional formation of future teachers has been conceived as a three level endeavor: the beginning level, comprising second year students taking educational foundation courses; the intermediate level, composed of advanced third year students taking advanced foundation and methodology courses. The advanced level of professional development includes students engaged in practice teaching.

The level of professional development is defined by the expected degree of excellence in the performance of a competency. The difference in performance for each level must be clearly determined. What is the difference in performance between a beginner, an intermediate and an advanced student? What is the minimum performance acceptable for each level to show mastery of content, excellence in skill utilization and improvement of attitude towards the profession? These questions must be clearly answered to state the competency in the second component.

Thinking skills, the subject of the second column must permeate the whole curriculum. These skills refer to as

> "the varied activities and operations that the mind exercises over any new information that it receives to restructure or organize it in order to produce new knowledge. They are procedures (steps) that operate on the information (Villarini, 1991)".

These thinking skills follow the natural sequence going from the basic thinking skills (observing, comparing/contrasting, ordering, grouping, labeling and classifying) to the more complex ones (inference, analysis, logical reasoning, evaluation, problem solving and decision making). These skills have been categorized according to their function: those that are useful for the gathering of information, those used in the organization of the information, those that go beyond the information, those needed to problem solving and decision making. In this model the thinking skills are identified according to developmental level and the contextual and instructional stimuli that will characterize the learning situation. This component requires a previous identification of the thinking skills proper of the discipline plus those skills required by the content of each course. See column 2 for examples of thinking skills for each level of professional development applied to a specific content.

The third column, titled Contextual Stimuli refers to the environment or context within which the teaching-learning experience takes place. The first level, the hypothetical context, describes the classroom atmosphere where students work with situations that are theoretical in nature. The second level or simulated context represents an environment characterized by rather structured learning experiences that allow a student to concentrate in the performance of a competency without the worry and uncertainty inherent in a real situation. Lastly, the real context refers to laboratory experiences where the pre-service teacher takes the role of an educational professional under the supervision of a competent and experienced teacher.

The fourth column presents the secondary themes within each major concept required by the program which was identified as the unit title. These themes appear listed according to the level of professional development and its corresponding contextual stimuli.

The fifth column presents a list of observable behavior expected of the student. These behaviors are related to the course content and become the specific objectives for the teaching-learning situation, and are the basis for the assessment process.

The instructional stimuli is described in the sixth column and includes a list of possible instructional techniques to show the methodological diversity of the learning experience. These stimuli are used within a more general instructional strategy known in Puerto Rico as ECA, the acronym for exploration, conceptualization, and application. These stimuli respond to three modes of teaching: the Meaningful learning model of Ausubel (1978), the Discovery

Model of Bruner (1960) and the Inquiry Model (Postman and Weingarter, 1969). Meaningful learning requires such mental skills as problem solving, creativity and a body of knowledge and skills necessary for the learner to go beyond what he/she is thinking. Through the process of finding out for himself/herself the solution to a problem a student learns how to learn. The latter will make a student a better problem solver, It will also help him/her to gain confidence in his/her ability to learn, and to face diverse situations.

Discovery learning requires students to find out for themselves the information through an understanding of how different ideas are interrelated. The relevance of the learning experience becomes, then, a personal matter based on the relationship between what he/she knows and what he/she should learn. This method of teaching will foster independence in the learner.

The inquiry model stimulates the student to learn by the use of incisive questioning, the discussion of ideas, argumentation and meaningful dialogue. The cooperative learning strategy is emphasized during all the instructional activities to stimulate collaboration and sharing of ideas. Other instructional techniques, such as, simulations, reflective readings, socratic dialogue, microteaching, metacognitive activities, and problem solving are used to provide for different learning styles.

Mode of Response in the seventh column refers to the mode in which the student will present the evidence to show mastery of the learned material. The written mode includes exercises such as reflection about the learned material, creative writing and diaries. Other types of exercises, such as, preparation of questions to be used in a discussion among peers or even questions to be included in an exam are to be encouraged. The verbal mode requires the student to take part in organized discussion, simulations, debates, etc. The recording mode is a valuable exercise since it can be later observed, discussed, analyzed, evaluated and revised by the students. These exercises provide an opportunity for introspection, internalization and metacognition. These processes are valuable for the processing of information and its encoding in the long-term memory. The pictorial mode, such as murals, collages, cartoons, etc., is ideal for creative expression.

Columns eight and nine depict the roles for both students and teachers. The student is conceived as an active agent, an information processor eager to discover and master knowledge. At the same time the student has a natural desire to improve his/her skills and to visualize the relevance of the content to his/her interests, needs and experiences, as they relate to his/her future professional life.

On the other hand, the role of the educator is a less directive one. He/she stops being the focal attraction in the classroom to become the generator of the action. The teacher does not relinquish his/her expertise, but acts in a different way. He/she

becomes the facilitator of the learning experience as he/she recognizes the thinking capacity of every student. The teacher allows divergency preparing the way for the development not only of critical thinking, but also of creative thinking.

Assessment, though presented in the last column, should permeate the whole instructional process. It must be authentic, that is, it is fair and matches the real professional world. It must also be continuous, varied, and dynamic to cover all aspects of the learning experience: knowledge, performance and attitudes. The evaluation criteria respond to the performance standard. Assessment instruments include not only the traditional ones, such as exams oral and written reports, but also those appropriate for the measuring improvement of thinking skills. The assessment of this dimension of the learning experience requires the use of diaries, questions that promote metacognition, problem solving and decision making. At the end of every lesson the student reflects about the learning experience as it is related to his/her thinking processes. As a guideline the student may use the following questions: What he/she thought was the purpose of the activity?, What evidence was used to do the task?, What information he/she found relevant to the assigned task?, and Which were the assumptions taken as a base of his/her decision. The student must finish his/her reflection by expressing his/her view as they relates the value of the activity as far as his professional preparation is concerned. Portfolios are excellent devices to gather this type of information.

This model was originally implemented at the Cayey University Colleges Teachers' Preparation Program. The authors feel that it can be adapted to any core content from any discipline or study program, whether of general or professional education.

A MODEL FOR INTEGRATING THINKING SKILLS IN THE CURRICULUM

Topic: Instructional Objectives

Competence: Write and use instructional objectives

Level of Professional Development	Thinking Skills	Context Stimulus	Themes (Concepts)	Performance Criteria	Instructional Stimulus	Mode of Response	Student's Role	Teacher's Role	Assessment Criteria
B E G I N N E R	Observation Comparing/ Contrasting Classifying Analysis Evaluation	H Y P O T H E T I C Context	Goals Objectives Instructional objectives Definition Elements Attributes Learning domains Taxonomies of objectives Writing of instructional objectives	Distiguish between goals and objectives. Identify learning domains Identify taxonomic levels Value the importance of stating objectives. Classification, analysis and evaluation of objectives.	Group activity Organized discussion Mini-con ference Writing workshop Analysis of objectives Evaluation of given objectives	Written Verbal Pictorial	Active Cooperative Explorer Socialize Discoverer	Facilitator Detect and correct wrong ideas. Promote cognitive desequili-brium. Promote Metacog-nition	Check lists Tests Journals Reflections Portfolio

L. E. Lopez & A. Sandez (1988)

A MODEL FOR INTEGRATING THINKING SKILLS INTO THE CURRICULUM

Topic: Write the topic of the unit

Competence: Write the competence to be developed through the unit

Level of Profesional Development	Thinking Skills	Context Stimulus	Themes (Concepts)	Performance Criteria	Instructional Stimulus	Mode of Response	Student's Role	Teacher's Role	Assessment Criteria
Depends on the student's course year: Beginner Intermediate Advanced	Includes thinking skills that will be emphasized through the unit	It refers to the context of the instructional experience Hypothetic at the beginner's level. Simulated at the intermediate level Real at the advanced level.	List the topics to be covered through the unit identifying the concepts to be developed.	Presents the objectives of the unit. They are the basis for the assessment process.	Includes the instructional techniques to be used in the development of the lessons	List the ways in which the student will respond to the contextual and instructional stimulus.	Describes the role of the student in his/her own learning.	Shows the role of the teacher in his/her teaching approach.	It shows the ways in which the tasks will be evaluated. It emerges from the objectives and the mode of response.

L. E. López & A. Sánchez (1993)

cont: A MODEL FOR INTEGRATING THINKING SKILLS IN THE CURRICULUM

Topic: Instructional Objectives — Competence: Write and use instructional objectives

Level of Professional Development	Thinking Skills	Context Stimulus	Themes (Concepts)	Performance Criteria	Instructional Stimulus	Mode of Response	Student's Role	Teacher's Role	Assessment Criteria
I N T E R M E D I A T E	Compare/ Contrast Classify Analysis Synthesis Evaluation	S I M U L A T E D Context	Review of knowledge acquired in the beginner level. Bloom's cognitive taxonomy Krathwohl's affective taxonomy Dave's psychomotor taxonomy Writing instructional objectives	80% mastery of previous material. Writing objectives for each domain and taxonomical level. Classifying objectives for each level of taxonomies. Analysis and evaluation of objectives.	Diagnostic Quiz Mini-conference Writing workshops Simulations Demonstrations Microteaching Self evaluation	Written Verbal Pictorial Videotapes	Active Actor Explorer Social Discoverer	Coach Inquirer Promote metacognition.	Quiz Tests Written objectives Videotapes Portfolio Self evaluation scales Reflections Logbook
A D V A N C E D	All previous skills and Problem solving Decision making	R E A L Context	Lesson planning: ECA Objectives Methodology Assessment	Planning design Demonstrate mastery of intermediate level.	Daily lesson plans	Written Professional performance Verbal Videotapes	Organizer Leader Problem-solver Decision-maker	Supervisor Evaluator Coach	Reflections Portfolios Self evaluation Check lists

L.E. Lopez & A. Sanchez (1990)

Topic: Write the topic of the unit

Competence: Write the competence to be developed through the unit

Level of Profesional Development	Thinking Skills	Context Stimulus	Themes (Concepts)	Performance Criteria	Instructional Stimulus	Mode of Response	Student's Role	Teacher's Role	Assessment Criteria
Depends on the student's course year: Beginner Intermediate Advanced	Includes thinking skills that will be emphasized through the unit	It refers to the context of the instructional experience Hypothetic at the beginner's level. Simulated at the intermediate level Real at the advanced level.	List the topics to be covered through the unit identifying the concepts to be developed.	Presents the objectives of the unit. They are the basis for the assessment process.	Includes the instructional techniques to be used in the development of the lessons	List the ways in which the student will respond to the contextual and instructional stimulus.	Describes the role of the student in his/her own learning.	Shows the role of the teacher in his/her teaching approach.	It shows the ways in which the tasks will be evaluated. It emerges from the objectives and the mode of response.

L. E. Lopez & A. Sanche

A MODEL FOR INTEGRATING THINKING SKILLS INTO THE CURRICULUM

Topic: Write the topic of the unit

Competence: Write the competence to be developed through the unit

Level of Profesional Developmen	Thinking Skills	Context Stimulus	Themes (Concepts)	Instructional Stimulus	Performance Criteria	Mode of Response	Student's Role	Teacher's Role	Assessment Criteria
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L. E. Lopez & A. Sanchez (1990)

AN EXAMPLE OF A LESSON
UNIT 1. INSTRUCTIONAL OBJECTIVES
LESSON 3. LEARNING DOMAINS

COURSE: EDFU 3002 Human Growth and Development II
CONTEXT: Hypothetical
LEVEL: Beginner
THINKING SKILL:
Classification

OBJECTIVE:
The student will classify objectives according to the learning domains.

ACTIVITIES:

A. Exploration

1. Discussion and analysis of the poem "I am a Human Being".
2. Listing of characteristics of a human being.

B. Conceptualization

1. Categorization of the characteristics listed during the exploration using the learning domains as a criteria.
2. Mini-conference about the cognitive, affective and psychomotor domains of learning.
3. Discussion
4. Summary of the class.

C. Application

1. Exercise to classify some objectives in their corresponding domain.
2. Reflection about the task just finished.

COURSE: EDPE 4001 Seminar on Curriculum and Teaching I
CONTEXT: Simulated
LEVEL: Intermediate
THINKING SKILL:
Evaluation

OBJECTIVE:
The student will evaluate objectives written by their peers.

ACTIVITIES:

A. Exploration

1. Each student will write a paragraph about the types of taxonomies of objectives for peer review.

B. Conceptualization

1. Analysis of several written objectives as to their taxonomic levels within each domain.
2. Practice in the writing of objectives.
3. Summary of the class.

C. Application

1. Workshop for peer-evaluation of written objectives.
2. Reflection about the task just finished.